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Project Report
Water Quality Assessment

Gig Harbor Bacteriological Survey

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Availability limited

State of Washington
Department of Ecology
Office of Water Programs
Water Quality Section
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Introduction

During March 1, 1978 a water quality survey was conducted in Gig Harbor. The purpose was to determine if water quality conditions in the harbor have improved as a result of the new STP and collection system completed by the community of Gig Harbor in March 1975. Data also was collected to determine if water quality conditions in West Gig Harbor (sewered) differ from East Gig Harbor (not sewered).

Methods

Locations of the 21 sampling stations are shown in Figure 1. Surface water samples were collected at high tide, 8:43 a.m. - 11.3 feet and low tide, 3:46 p.m. - .08 feet. At each sampling station the following water quality characteristics were measured in the field: Dissolved oxygen, pH, conductivity, salinity, temperature, and secchi disc. In addition, water samples were collected and transported to the DOE Analytical Laboratory for the following analyses: total coliform, fecal coliform, nitrates, nitrites, ammonia, orthophosphates and total phosphates.

Results

The results of the survey are presented in Tables 1 and 2. These data indicate there has been a definite improvement in water quality in Gig Harbor since the new collection system and treatment plant was installed. This trend is evident when the coliform results of this survey are compared with a similar survey conducted on November 30, 1971 (See Figures 2 and 3). Using high tide sampling data, the 1978 fecal coliform counts were lower at 8 of the 11 stations where comparable data was collected during both years. The higher 1978 counts at stations 1, 3 and 19 were traced to approximately 90 cattle which inhabit both sides of Crescent Creek, two miles upstream from the mouth. The high fecal counts at stations 2, 5, 6 and 10 can be explained by the concentration of pleasure craft moored in Gig Harbor near these stations. An estimated 480 to 500 craft are moored in the harbor during winter. About six of these have permanent residents as of this survey. A copy of the 1971 Gig Harbor study is attached for further comparison (Appendix I).

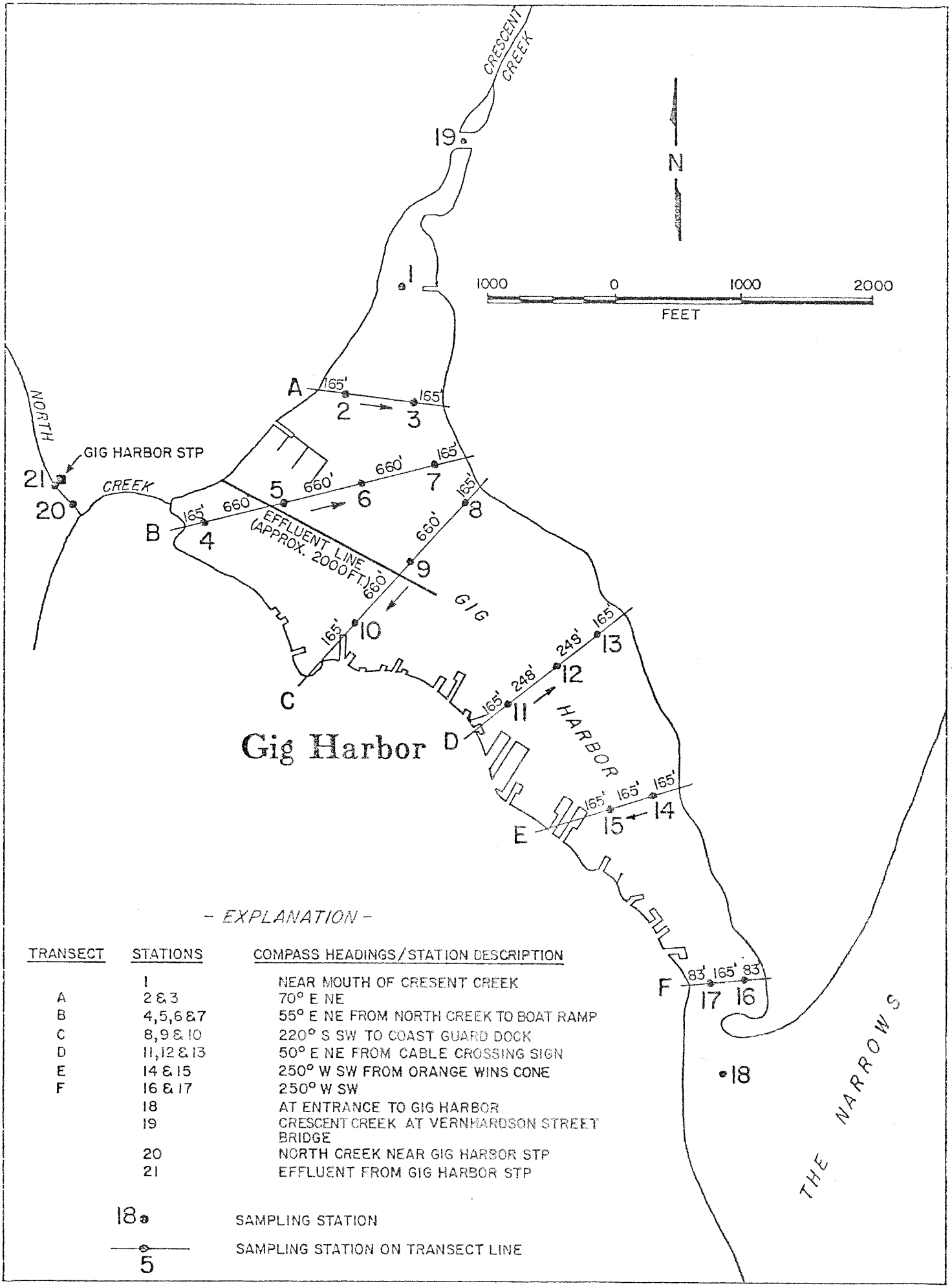
East Gig Harbor has a higher overall fecal concentration than the west side (Figures 4 and 5). The one exception is station 10 near the boat moorage.

The high tide bacterial densities were significantly greater than during low tide (Table 1). This was probably due to tidal influence. The low salinity surface waters appear to be carried from the harbor as the tide recedes then, during flood tide, these waters remain fairly stable and rise as the heavier marine waters enter the harbor.

Even though water quality conditions have improved, Gig Harbor is Class AA waters and the following fecal coliform criteria are being exceeded at this time:

Class AA Standards Marine Waters	Survey Results March 1, 1978
14 organisms/100 ml (median value)	26 organisms/100 ml (median value)
Not more than 10 percent of samples exceeding 43 organisms/100 ml	11 percent exceeding 43 organisms/ 100 ml

The 1978 results given above are based only on data obtained at stations 1 to 18, the marine stations.



- EXPLANATION -

TRANSECT	STATIONS	COMPASS HEADINGS/STATION DESCRIPTION
	1	NEAR MOUTH OF CRESENT CREEK
A	2 & 3	70° E NE
B	4,5,6 & 7	55° E NE FROM NORTH CREEK TO BOAT RAMP
C	8,9 & 10	220° S SW TO COAST GUARD DOCK
D	11,12 & 13	50° E NE FROM CABLE CROSSING SIGN
E	14 & 15	250° W SW FROM ORANGE WINS CONE
F	16 & 17	250° W SW
	18	AT ENTRANCE TO GIG HARBOR
	19	CRESCENT CREEK AT VERNHARDSON STREET BRIDGE
	20	NORTH CREEK NEAR GIG HARBOR STP
	21	EFFLUENT FROM GIG HARBOR STP

18 • SAMPLING STATION

5 SAMPLING STATION ON TRANSECT LINE

Figure 1. GIG HARBOR BACTERIOLOGICAL SAMPLING STATIONS.

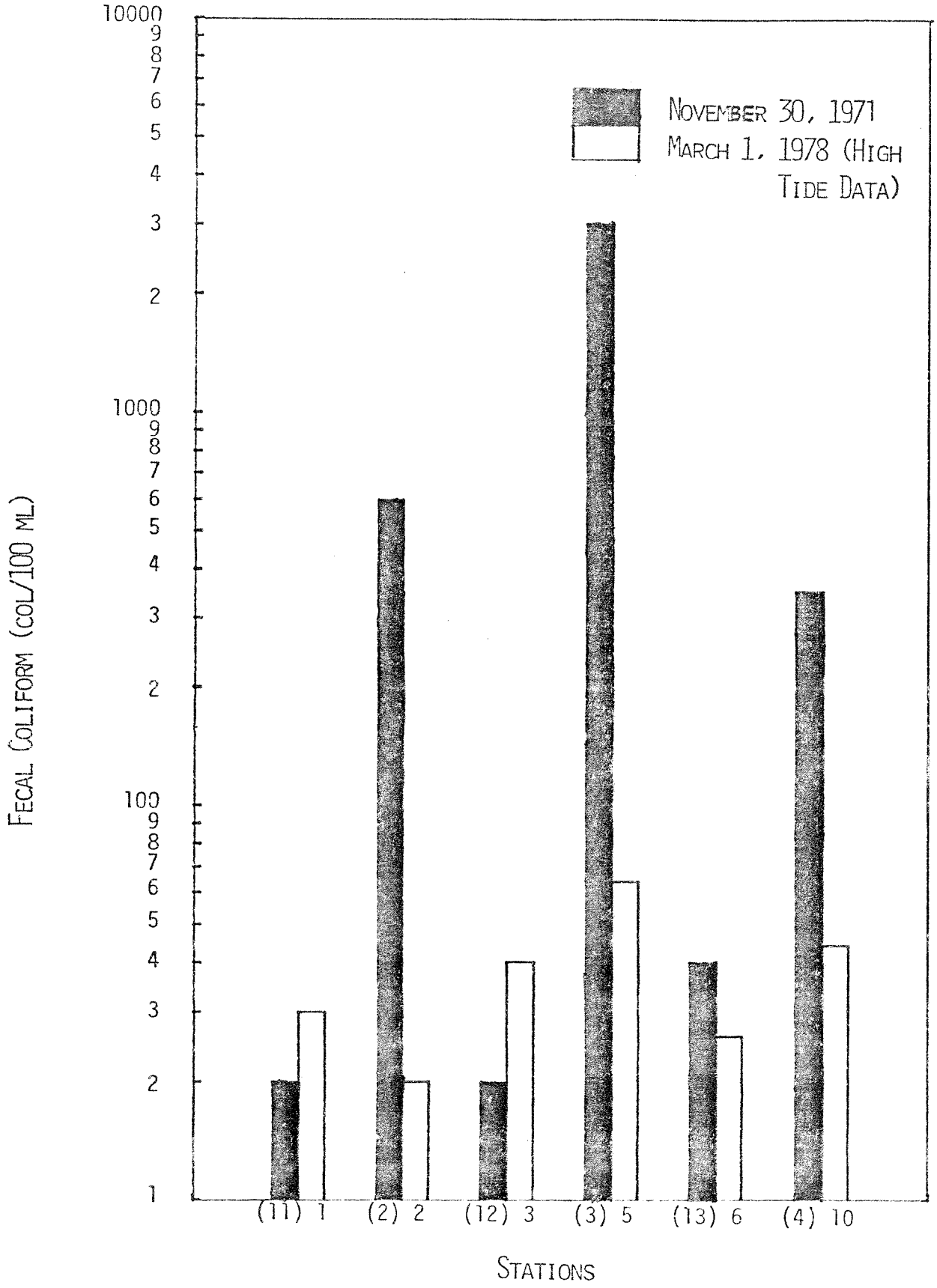


FIGURE 2. GIG HARBOR FECAL COLIFORM STATION COMPARISONS

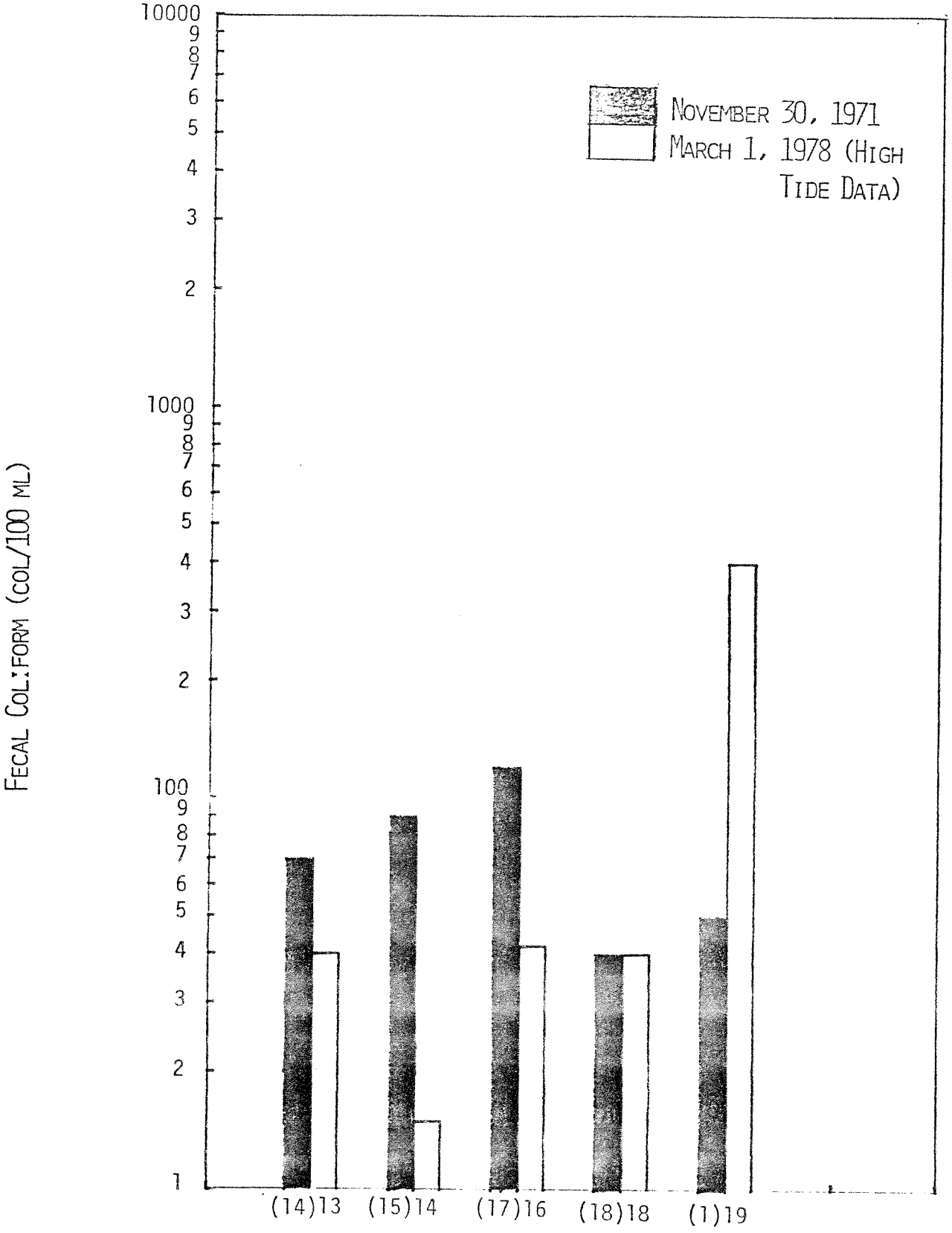


FIGURE 3. GIG HARBOR FECAL COLIFORM STATION COMPARISONS. (CONTINUED)

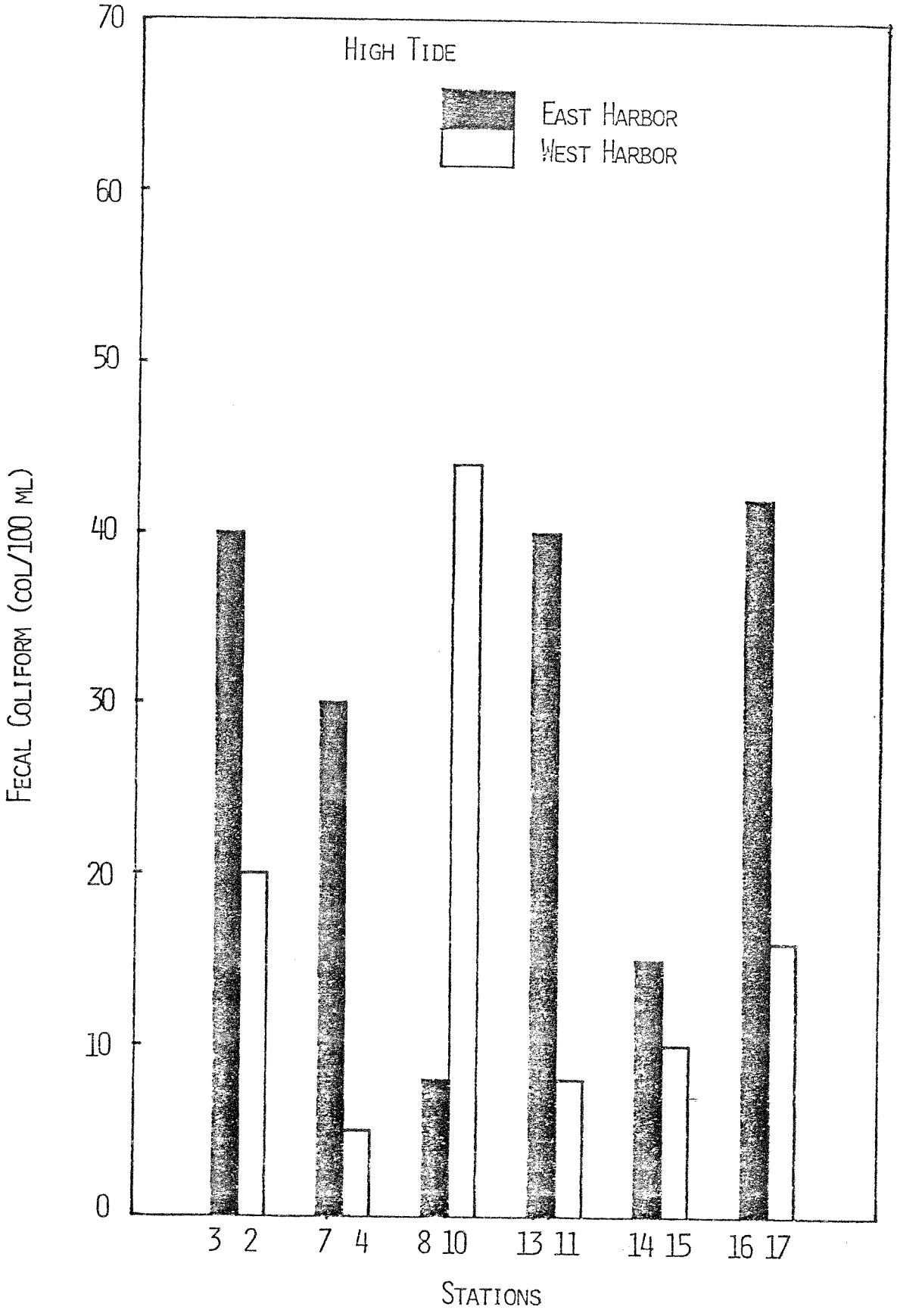


FIGURE 4. GIG HARBOR FECAL COLIFORM COMPARISON - WEST HARBOR TO EAST HARBOR - MARCH 1, 1978

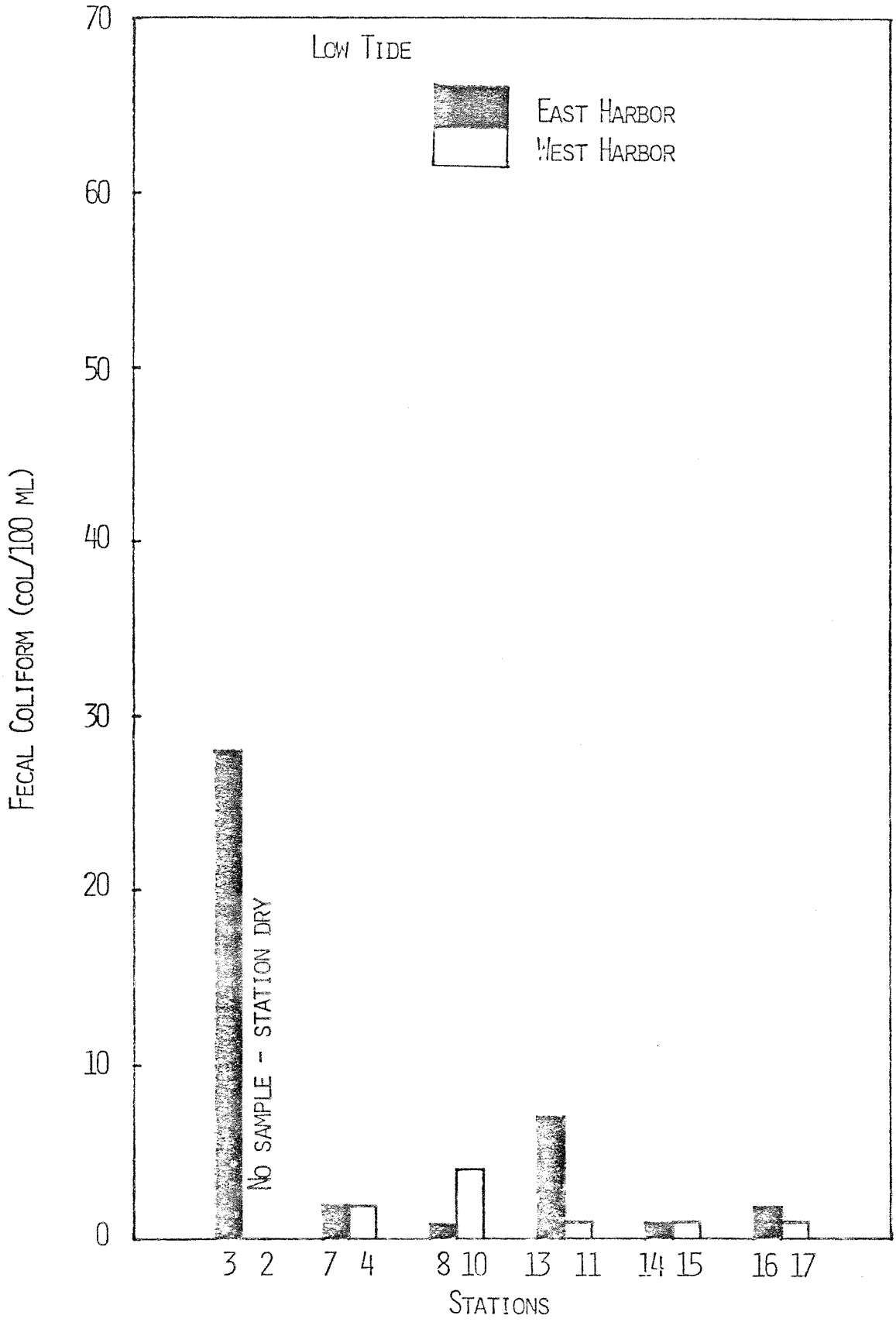


FIGURE 5. GIG HARBOR FECAL COLIFORM COMPARISON - WEST HARBOR TO EAST HARBOR - MARCH 1, 1978

Table 1

Laboratory Results of Gig Harbor Bacteriological Survey - High and Low Tides March 1, 1978

(1) Station	Total Colif. (Col/100 ml)		Fecal Colif. (Col/100 ml)		NO_3-N (Filtered)		NO_2-N (Filtered)		NH_3-N (Unfiltered)		O-PO_4-P (Filtered)		Tot. Phos-P (Unfiltered)	
	High	(2) Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
1	180 est.	(3)---	30 est.	- -	.40	- -	<.02	- -	.02	- -	.41	- -	.39	- -
2	35 est.	- -	20 est.	- -	.38	- -	<.02	- -	<.02	- -	.08	- -	.11	- -
3	300 est.	50 est.	40	28	.42	.43	<.02	< .02	<.02	.02	.07	.06	.07	.11
4	32 est.	< 2	5 est.	2	.37	.38	<.02	< .02	<.02	.02	.07	.07	.08	.09
5	190	< 5	64	< 2	.37	.38	<.02	< .02	<.02	.02	.29	.07	.29	.10
6	420	< 2	26 est.	1	.38	.38	<.02	< .02	<.02	.02	.08	.05	.08	.09
7	100	2 est.	30 est.	2	.42	.37	<.02	< .02	<.02	.02	.34	.06	.34	.11
8	46 est.	< 2	8 est.	< 1	.39	.37	<.02	< .02	<.02	.02	.08	.08	.10	.08
9	10 est.	< 2	2 est.	1	.39	.39	<.02	< .02	.05	.02	.23	.07	.26	.07
10	370	8 est.	44	4	.39	.39	<.02	< .02	<.02	.02	.79	.05	.74	.06
11	36 est.	2 est.	8 est.	1	.39	.39	<.02	< .02	<.02	.02	.48	.05	.49	.08
12	10 est.	2 est.	7 est.	1	.39	.39	<.02	< .02	<.02	.02	.10	.04	.10	.07
13	1000	12 est.	40	7	.40	.38	<.02	< .02	<.02	.02	.07	.09	.09	.09
14	52 est.	2 est.	15 est.	1	.39	.39	<.02	< .02	<.02	.02	.08	.07	.08	.07
15	52 est.	6 est.	10 est.	1	.39	.39	<.02	< .02	<.02	.02	.07	.07	.08	.08
16	100	3 est.	42 est.	< 2	.39	.39	<.02	< .02	<.02	.02	.07	.07	.07	.09
17	56 est.	7 est.	26 est.	1	.39	.40	<.02	< .02	<.02	.02	.06	.07	.11	.11
18	140	< 2	40	< 1	.39	.40	<.02	< .02	<.02	.02	.06	.07	.07	.07
19	1200 est.	(4)NS	400	NS	.59	NS	<.02	NS	.02	NS	.03	NS	.04	NS
20	10 est.	NS	7 est.	NS	.51	NS	<.02	NS	<.02	NS	.03	NS	.04	NS
21	10 est.	NS	< 2	NS	.02	NS	<.02	NS	21.	NS	2.1	NS	5.4	NS

(1) For station locations see Figure 1.
(2) High tide 8:43 A.M. 11.3 ft.
Low tide 3:46 P.M. .08 ft.
(3) Low tide stations dry
(4) (NS) No sample taken

NOTE: All results are in PPM (mg/l) unless otherwise specified.

Est. = estimated count based on non-ideal conditions.

Table 2

Field Results of Gig Harbor Bacteriological Survey - High and Low Tides March 1, 1978

	Dissolved Oxygen		pH		Cond.		Sal.		Temp (°C)		Secci (meters)	
(1) Station	High	(2) Low	High	Low	High	Low	High	Low	High	Low	High	Low
1	7.8	(3)	7.6	- -	33.6	- -	32.3	- -	7.4	- -	- -	- -
2	7.7	- -	7.6	- -	31.6	- -	29.8	- -	7.6	- -	- -	- -
3	7.9	9.1	7.7	7.6	31.4	33.6	29.7	30.7	7.6	9.1	- -	- -
4	8.2	8.4	8.0	7.5	30.7	33.7	29.0	31.2	7.5	8.5	- -	- -
5	8.2	8.1	7.7	7.5	31.6	35.2	30.2	33.0	7.2	8.4	4.50	5.1
6	8.4	8.0	7.7	7.8	32.5	34.5	31.3	32.5	7.1	8.2	4.50	3.9
7	8.6	8.5	7.5	7.7	28.5	36.2	27.5	34.0	6.8	8.4	4.80	- -
8	8.6	9.0	7.2	7.8	30.8	35.0	29.3	32.8	7.1	8.2	5.10	- -
9	8.5	8.3	8.0	7.7	33.0	33.2	31.7	31.2	7.3	8.0	5.40	3.9
10	8.8	8.6	7.8	7.8	30.5	33.7	29.4	31.7	6.5	8.0	4.50	3.0
11	8.7	8.5	7.8	7.5	30.7	31.7	29.1	29.5	7.2	8.1	4.80	3.3
12	8.4	8.3	7.8	7.7	31.9	32.4	30.3	30.1	7.4	8.1	5.10	4.20
13	8.6	8.6	8.0	8.1	30.8	31.8	29.2	29.5	7.6	7.9	5.10	- -
14	8.6	8.6	7.8	7.8	31.7	32.0	30.3	29.8	7.4	8.0	5.40	5.40
15	8.6	8.2	7.9	7.6	31.8	32.4	30.1	30.6	7.5	7.8	6.60	5.40
16	8.6	8.6	7.9	7.5	31.9	32.2	30.5	30.2	7.4	8.0	5.70	4.80
17	8.7	8.7	7.7	7.3	31.7	30.8	30.2	28.8	7.5	7.8	5.70	4.50
18	8.7	8.6	7.8	7.6	31.6	32.1	30.0	30.2	7.3	7.6	5.40	6.30

(1) For station locations see Figure 1.
(2) High tide 8:43 A.M. 11.3 ft.
Low tide 3:46 P.M. .08 ft.
(3) Low tide, stations dry

APPENDIX I

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

M E M O R A N D U M

TO: MIKE PRICE & GENE ASSELSTINE December 17, 1971

FROM: RON PINE

SUBJECT: Gig Harbor Bacteriological Survey

At your request dated November 11, 1971, a bacteriological survey was made in Gig Harbor on November 30, 1971. The objective of the study was to gather evidence that specific dischargers are violating State Water Quality Standards. You requested that the survey include names and addresses of specific dischargers and samples to show their effects upon water quality.

In subsequent discussions with Mike Price, it was my understanding that our phase of the study would involve sampling in the receiving water (Gig Harbor) only, and that sampling and obtaining names and addresses of specific dischargers would be done by the Pierce County Health Department.

The results of the study are presented in Table 1. The specific station locations are described in Table 2 and are shown in Figure 1. All samples were collected between 1110 and 1141 PST. The morning low tide was 6.9 feet at 0842 and the next high was 12.1 feet at 1400. Water temperature was 9.0 C at all stations.

All of the total coliform values, except at stations 12, 13, and 18 exceed the maximum criteria of 230 colonies/100 ml's for Class AA waters.

RP:dc

18/01

TABLE 1

Results of Gig Harbor Bacteriological Study, November 30, 1971

STATION	COLIFORM	FECAL COLIFORM
1	900	50
2	15,000	600
3	80,000	3,000
4	10,000	350
5	10,000	1,500
6	60,000	7,000
7	4,000	450
8	7,000	1,000
9	1,200	150
10	900	60
11	300	20
12	150	20
13	100	40
14	600	70
15	800	90
16	600	70
17	600	120
18	20	40

TABLE 2

Station Descriptions, Gig Harbor Bacteriological Study November 30, 1971

STATION	DESCRIPTION
1	Crescent Creek on Gig Harbor Side of culvert
2	Peninsula Yacht Basin Dock east of Standard oil dock
3	Shoreline Cafe Dock on north side over sewer discharge
4	North side of Eddom Boat Company
5	North side of Washington Fish and Oyster Company
6	South side of Pleasure Craft Marina over storm sewer discharge
7	South side of Shell oil dock
8	North side Bay Shore Marina
9	South side of Bayshore Marina
10	Shoreline Cafe at end of dock
11	North side of Harbor near Crescent Creek adjacent to olive green apartment House
12	North side of Harbor near red House with white trim
13	North west center of Harbor
14	Midway down north shore of Harbor
15	Two-thirds of the way down north side of Harbor
16	Opposite Station 15 and middle of Harbor
17	North side of Harbor close to Harbor entrance
18	At entrance to Gig Harbor